



## Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact [support@jstor.org](mailto:support@jstor.org).

## MECHANICS.

54. Proposed by C. H. WILSON, Poughkeepsie, N. Y.

A body slides from rest down a series of smooth inclined planes, whose total heights are  $h$  feet. Show that the velocity at the bottom is  $\sqrt{2gh}$  feet per second. [From *Wright's Mechanics*.]

Solution by G. B. M. ZERR, A. M., Ph. D., President and Professor of Mathematics in Russell College, Lebanon, Va.; and J. SCHEFFER, A. M., Hagerstown, Md.

Let  $v_1, v_2, v_3, \dots, v_n$  be the velocities at the bottoms of the planes,  $h_1, h_2, h_3, \dots, h_n$  their respective heights.

$$\therefore v_1 = \sqrt{2gh_1}, \quad v_2 = \sqrt{2gh_1 + 2gh_2} = \sqrt{v_1^2 + 2gh_2},$$

$$v_3 = \sqrt{v_2^2 + 2gh_3} = \sqrt{2gh_1 + 2gh_2 + 2gh_3},$$

$$v_n = \sqrt{2gh_1 + 2gh_2 + \dots + 2gh_n} = \sqrt{2g(h_1 + h_2 + h_3 + \dots + h_n)} = \sqrt{2gh},$$

since  $h_1 + h_2 + h_3 + \dots + h_n = h$ .

Also solved by HENRY HEATON, C. W. M. BLACK, and CHAS. C. CROSS.

55. Proposed by ALFRED HUME, C. E., D. Sc., Professor of Mathematics, University of Mississippi, University P. O., Miss.

Three equal heavy spheres, each of weight  $W$ , are placed on a rough ground just not touching each other. A fourth sphere of weight  $nW$  is placed on the top touching all three. Show that there is equilibrium if the coefficient of friction between two spheres is greater than  $\tan \frac{1}{2}\alpha$ , and that between a sphere and the ground is greater than  $\tan \frac{1}{2}\alpha/(n+3)$ , where  $\alpha$  is the inclination to the vertical of the straight line joining the centers of the upper and one lower sphere.

I. Solution by WILLIAM HOOVER, A. M., Ph. D., Professor of Mathematics and Astronomy in Ohio University, Athens, O.

Let  $\alpha$  be the angle which the line of centers of the upper sphere and each of the lower makes with the vertical,  $R$  the reaction of the upper and each of the lower spheres,  $m$  the corresponding coefficient of friction,  $m_1$  the coefficient for each lower sphere and the plane.

The system is kept at rest by the weights  $nW, W$ , acting vertically,  $R$  the reaction in direction of centers,  $mR$ , friction acting in the tangent through the point of contact of the upper and lower spheres, and  $m_1(nW + 3W)$  horizontally and inward.

For the equilibrium of the upper sphere, resolving vertically,

$$3R\cos\alpha + 3Rm\sin\alpha = W \dots \dots \dots (1);$$

and for the lower, resolving horizontally,

$$\frac{1}{2}(nW + 3W)m_1 = R\sin\alpha - Rm\cos\alpha \dots \dots \dots (2).$$

$$\text{Also, } R = \frac{1}{2}nW \dots \dots \dots (3).$$

$$(1), (2), \text{ and } (3) \text{ gives } m = \tan \frac{1}{2}\alpha, \quad m_1 = [n/(n+3)]\tan \frac{1}{2}\alpha.$$

Also solved by G. B. M. ZERR and the PROPOSER. Their solutions will appear in next number.